6 A company is involved in robotics.

One of its robots is designed to make a specific movement depending on a binary value.

(a) The table gives some of the movements for the robot.

Complete the table by writing the missing binary, denary or hexadecimal value for each movement.

Movement	Binary	Denary	Hexadecimal
forward 1 step	00011111	31	
back 1 step		140	8C
turn right	01011010		5A
turn left		120	78

[4]

Working space

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(b) Describe what is meant by robotics.

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(c) The robot has a sensor and a microprocessor.

The robot will move forward continuously until it detects an object that is less than or equal to 10 cm in front of it.

If an object is less than or equal to 10 cm in front of it, the robot turns 90 degrees right. It then tries to move forward again.

Explain how the sensor and the microprocessor are used to automate this robot.

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(d) The robot needs to find its way through different puzzles. Each puzzle has a series of paths that the robot needs to follow to find its way to the end of the puzzle. The puzzle contains dead ends and obstacles, so the robot needs to decide which way to go.

The robot's program will use artificial intelligence (AI).

(i) Describe the characteristics of AI.

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(ii) Explain how the program will use AI.

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